

What is claimed is:

1. A projection-type image display device comprising:
    - a light source;
    - converging optics for converging light from the light source, the converging optics including a reflector for condensing light from the light source;
    - a rod integrator having a first optical axis that receives the collected light and that includes a light beam entrance end near a point where the collected light converges and a light beam exit end at the opposite end of the rod integrator arranged so that the light exiting the exit end of the rod integrator forms a light beam with a homogeneous cross-section in a plane perpendicular to the first optical axis;
    - light beam deflecting means for deflecting the light beam from the rod integrator;
    - a digital micromirror device that receives said light beam from said light beam deflecting means and that includes an array of micromirrors arranged in a plane, each micromirror being rotatable between two positions for modulating said light beam by selectively reflecting incident light in a first direction or in a second direction depending on a picture signal that switches the positions of the micromirrors between the two positions;
    - a projection lens having a second optical axis for projecting the modulated light beam from the digital micromirror device toward a projection screen;
    - light beam separating means for directing said light beam from said light beam deflecting means to the digital micromirror device and for directing the light beam directed to the digital micromirror device and modulated by the digital micromirror device along the second optical axis;
- wherein
- the first optical axis and the second optical axis are skewed relative to one another; and
  - the rod integrator is positioned between said light beam separating means and said projection lens in the direction of the second optical axis and is outside the optical path of the modulated light beam from the digital micromirror device as the modulated light beam passes from the digital micromirror device to the projection lens.

1 2. The projection-type image display device of claim 1, wherein the projections of said first  
2 optical axis and said second optical axis onto a common plane are substantially orthogonal to one  
3 another.

1 3. The projection-type image display device of claim 1, and further including a leaky ray  
2 shielding member for shielding light leakage at least at one of the following places on the rod  
3 integrator: near the light beam entrance end of the rod integrator, near the side walls of the rod  
4 integrator, and near the light beam exit end of the rod integrator.

1 4. The projection-type image display device of claim 2, and further including a leaky ray  
2 shielding member for shielding light leakage at least at one of the following places on the rod  
3 integrator: near the light beam entrance end of the rod integrator, near the side walls of the rod  
4 integrator, and near the light beam exit end of the rod integrator.

1 5. The projection-type image display device of claim 1, wherein the rod integrator includes a  
2 solid rod member with an entrance end, an exit end, and side walls, and the rod integrator directs  
3 the light entering its entrance end to its exit end while totally reflecting the light on its side walls.

1 6. The projection-type image display device of claim 2, wherein the rod integrator includes a  
2 solid rod member with an entrance end, an exit end, and side walls, and the rod integrator directs  
3 the light entering its entrance end to its exit end while totally reflecting the light on its side walls.

1 7. The projection-type image display device of claim 3, wherein the rod integrator includes a  
2 solid rod member with an entrance end, an exit end, and side walls, and the rod integrator directs  
3 the light entering its entrance end to its exit end while totally reflecting the light on its side walls.

1 8. The projection-type image display device of claim 4, wherein the rod integrator includes a

2 solid rod member with an entrance end, an exit end, and side walls, and the rod integrator directs  
3 the light entering its entrance end to its exit end while totally reflecting the light on its side walls.

1 9. The projection-type image display device of claim 5, wherein the rod integrator further  
2 includes a hollow member provided on the light exit end of said solid rod member for guiding  
3 the light from the exit end of said solid rod member.

1 10. The projection-type image display device of claim 6, wherein the rod integrator further  
2 includes a hollow member provided on the light exit end of said solid rod member for guiding  
3 the light from the exit end of said solid rod member.

1 11. The projection-type image display device of claim 7, wherein the rod integrator further  
2 includes a hollow member provided on the light exit end of said solid rod member for guiding  
3 the light from the exit end of said solid rod member.

1 12. The projection-type image display device of claim 8, wherein the rod integrator further  
2 includes a hollow member provided on the light exit end of said solid rod member for guiding  
3 the light from the exit end of said solid rod member.

1 13. The projection-type image display device of claim 1, wherein said reflector is a parabolic  
2 reflector, a condenser lens is provided that includes at least one aspheric lens surface, and the  
3 condenser lens converges light from said light source that is collected by said parabolic reflector.

1 14. The projection-type image display device of claim 2, wherein said reflector is a parabolic  
2 reflector, a condenser lens is provided that includes at least one aspheric lens surface, and the  
3 condenser lens converges light from said light source that is collected by said parabolic reflector.

1 15. The projection-type image display device of claim 3, wherein said reflector is a parabolic

2 reflector, a condenser lens is provided that includes at least one aspheric lens surface, and the  
3 condenser lens converges light from said light source that is collected by said parabolic reflector.

1 16. The projection-type image display device of claim 4, wherein said reflector is a parabolic  
2 reflector, a condenser lens is provided that includes at least one aspheric lens surface, and the  
3 condenser lens converges light from said light source that is collected by said parabolic reflector.

1 17. The projection-type image display device of claim 5, wherein said reflector is a parabolic  
2 reflector, a condenser lens is provided that includes at least one aspheric lens surface, and the  
3 condenser lens converges light from said light source that is collected by said parabolic reflector.

1 18. The projection-type image display device of claim 6, wherein said reflector is a parabolic  
2 reflector, a condenser lens is provided that includes at least one aspheric lens surface, and the  
3 condenser lens converges light from said light source that is collected by said parabolic reflector.

1 19. The projection-type image display device of claim 7, wherein said reflector is a parabolic  
2 reflector, a condenser lens is provided that includes at least one aspheric lens surface, and the  
3 condenser lens converges light from said light source that is collected by said parabolic reflector.

1 20. The projection-type image display device of claim 8, wherein said reflector is a parabolic  
2 reflector, a condenser lens is provided that includes at least one aspheric lens surface, and the  
3 condenser lens converges light from said light source that is collected by said parabolic reflector.